

Dr Margaret Karembu
The AfriCenter, Kenya

Good Morning, Ladies and Gentlemen. I'm from Africa, from a university, but I also work very closely with the International Service for the Acquisition of Agri-biotech Applications (ISAAA), working with Dr. Florence Wambugu, in Nairobi, mainly involved with technology transfer issues.

Florence was supposed to attend this conference but she was already engaged in some other biotech activities in South Africa. However, she gave me one message for this conference which I will pass on to you before I present my work, and this is mainly to do with the kind of responsibility that we all have as a global community in managing the kind of biotechnology information that we release to the public. This has quite a distinct impact on the way people perceive these technologies, and more so in Africa because you know Africa has had a long history with Europe and whatever comes out from Europe has a great impact on Africa. Right now I can tell you that our public image of the technology is confused because of the kind of information that is being passed on from Europe to Africa. So we must manage information on this technology to ensure the global responsibility we have for the poor.

Now my presentation is to look at the developments in agricultural biotechnology in Africa. So the title of my talk is "Developments of agricultural biotechnology in Africa" and for us to understand the context under which we put our technology for developed and developing countries, it's important to look at the kind of challenges we face. Part of my presentation may look like repetition, because when you present second or third after others, you may have previously planned to say some of the things that other people have said. But nevertheless, I'll lead you through it.

The major challenge that we have is how to feed the two billion more people will be added to the globe within the next 25 years, taking into consideration the environmental protection and the distribution of food that we have in the world. If you look at the food situation in developed countries, we are at a stage where we can talk of abundance and surplus. We can talk of high yields because we have used modern farming technology. We are using high yielding seeds, fertilizers, pesticides and good practices. We also look at developed countries in terms of supporting their policies and infrastructure that they have in terms of subsidies, in terms of funded research and extension and so on. When you look at these important points it is not very difficult to ask ourselves about what kind of challenge we are talking about as far as food availability in developed countries is concerned. Here we are more concerned about quality, but we do have something on the table don't we.

Now when you look at the food situation in developing countries we have an inadequate food supply. These are common statistics that we get from the WHO from the FAO; 800 million people are malnourished, 250 million people are surviving on less than a dollar a day. This is a reality, it's not a myth. 230 million children suffer from Vitamin A deficiency, about 100,000 are going blind each year. 54% of child mortality in the developing world is because of malnutrition, while 400 million women have iron deficiency.

Again, most of the agricultural systems in developing countries are unsustainable because of various factors. The first one is the low technology transfer, then we have policy limitations, we have had infrastructure limitations. 70% of the farmers are women with no ownership of land, no freedom to make any decisions as to what technology to take and unfair global trading limitations as well as a severe environmental deprivation.

Now if you look at the state of current global yields for some important food crops in Africa and the rest of the world, we find that Africa has a very low yield per hectare compared to other regions, regardless whether it's Asia or South America or Europe. Maize, for example, has a 1.7 tonnes per hectare yield on average in Africa whilst in the world we have a 4.11 tonnes per hectare yield. With the banana, we have 6 tonnes per hectare in Africa and in the world the average is about 10.11 per hectare. We know that it has the yield potential of about 60 tonnes per hectare as we have seen in one of the projects that I'm going to highlight briefly.

Now the situation in Africa on poverty and malnutrition is even more worrying. Poverty levels are increasing, 40% live above the poverty line while 60% are actually living in absolute poverty. In terms of malnutrition, 30% are considered chronically undernourished. Now again when you look at expenditures on food in Africa, 80% of total earnings are spent on food. This is a lot different from what we heard at yesterday's presentation, about the kind of money that people are spending on leisure in Europe.

As far as population and food aid is concerned, 17% of the population in Kenya last year survived on food aid. That is a very significant number of people surviving from food aid because they cannot produce their own food. We've had severe drought which is not helping the food problem, with 22 million people affected out of the 30 million Kenyans.

So what are some of the challenges in African agriculture? We need to increase food production because population increases at 3.5% per year while food production increases only at 2.5% per year. We need increased productivity because we are experiencing a rapid decline in the average farm size per family. Again we need to improve biodiversity because when agriculture is unsustainable you continue farming on poor soils, adding to the problem of unsustainability. At the same time, there is a lot of movement to poor and marginal areas with more severe biodiversity loss. Increased productivity on existing agricultural lands would have a smaller impact on biodiversity in comparison.

We see the role of biotechnology in terms of protecting the environment, better quality and healthier seeds. We have highlighted some of the activities that are going on in Kenya because in Africa what we have been doing is to systematically introduce the relatively simpler technologies like tissue-culture technology and molecular markers before we get into the more complex stages - ie genetically modified products. Unfortunately, again because of the largely uninformed public, and the fact that there is a lot of negative publicity about biotechnology coming from the developed countries and especially Europe, unfortunately, we've had cases where even the relatively simple technologies are confused with genetically modified products. We really have a difficult task of educating our farmers about the safety of some of these technologies and the simplicity and how they can cause impact.

In Kenya we are mainly involved in tissue-culture, molecular markers and GM crops. We had our first field trial of the genetically modified sweet potato, which is a KARI (Kenya Agricultural Research Institute) project. We have not had any commercial products, and we do not expect to have any products until maybe some 3 or 4 years from now. We need to ensure that we have done enough environmental assessment, enough food safety assessment and identified the various risks.

We are hearing that this is quite a task because even within conventional breeding, we still do not have any data that is comparable. In Zimbabwe we have some tissue-culture products and in South Africa we have all these commercial products like cotton and corn. All the other countries in Africa generally have not yet had any GM products. Uganda has some, Egypt has some, South Africa has had a success story with the Magatini experience, where farmers are growing Bt cotton and they have experienced some yield increases of about 5%. Insecticide has been reduced by about 80% because of environmental conservation. Farmers' incomes have increased to about 150 dollars per hectare. After only one growing season the number of Magatini farmers using Bt is growing and has continued to grow, increasing 15%.

So what is the way forward for biotechnology in Africa? First and foremost we need to have a proactive policy that is not biased and is not influenced by misconceptions, propaganda and sensationalism. Then we need to now put our biosafety regulations in operation and in this regard about eight countries in Africa have operational safety regulations which measure up to international standards. So we feel that we are getting quite ready to try out these more complex technologies. Then we need to work on our public awareness and acceptance and as I say here this has mainly been influenced by the kind of information that Africa is getting from the West and especially from the Greens and here we are asking for more responsibility as far as communicating factual information is concerned because most of what we get is not supported with scientific data.

If we do not have scientific data then what you are getting in Africa is mainly people's diverse opinions. You cannot make policies and positions based on individual opinions. We need facts to improve on our public acceptance of the technology. It is even more disheartening to find that the target of anti-GM organizations has been grass root communities, undermining the scientists in Africa. By the time you go to talk to farmers about some of the simple technologies like tissue-culture, they have already been poisoned about the dangers of biotechnology in general, without regard to the distinction between these technologies.

We also need collaborative research. We find that investments in research and development in Africa are considerably low compared to the private sector. In fact, our public sector is really down in terms of capacity, in terms of infrastructure, so we need to link up, we need to have interface between private and public partnerships. We need to build our scientific capacity, we need to improve our Intellectual Property Right (IPR) protection for freedom to operate and then we need to have effective delivery and distribution systems so that our farmers can get the seeds they need delivered, given the kind of infrastructure that we have.

I would like to highlight some of the ISAAA projects. We have projects on virus resistance in sweet potatoes, tissue culture to revive banana production in Kenya, and maize in Africa, where we've had the first release of a maize variety that is resistant to the maize virus. Farmers are now growing seeds that are resistant to MSV thanks to the studies and the collaboration that has been between Novartis Seeds and KARI and of course with the financial donation from the Rockefeller Foundation.

ISAAA is a small organisation, mainly dealing as a broker for technology transfer, helping developing countries acquire technologies from both the private and public sectors. Most of the technologies are driven by industry so we need to know about IPR issues and we also need to identify collaborators in providing linkages and then facilitate the necessary back stopping, budget and financial handling.

I would like to talk about a case study called the Bar Technology and its benefits to more skilled farmers in Kenya. It is mainly meant to show that poor farmers can handle technology. It's a misconception that our farmers are illiterate and are not really good farmers. They could be illiterate, but they have the know-how to be able to benefit from these technologies.

This project started off as a result of problems with degeneration of banana production. The way we started is by setting priorities with all the stakeholders, discussing them, doing what you call the PR appraisals to identify the needs. Once these needs are identified we then prioritise.

Here the need was for clean seedlings because of the problems with diseases and pests within the banana growing region. The major constraints are diseases and pests, and the consequences have been low yields, increased prices and low demand for bananas.

Tissue-culture technology has advantages that are proven, which targets the objective of providing clean planting materials that are also compatible with cultural practice. The technology transfer involves a strategy, a team of scientists, economists, policy makers and the networking of partners in all of ISAAA related projects. It works within the national agricultural research system, helping to build capacity and then linking with the private sector in developing countries. GTL, Genetic Technologies Limited, is a local private tissue culture company in Kenya dealing with crops like banana, sugar cane and trees. We then have the technology evaluators who are the farmers and the scientists and then the financial donors and the Rockefeller Foundation.

Then it mainly involves working with the farmers, encouraging family partnerships and gender sensitivity. Field training is where the experts in the team provide training and education on how to manage the technology, and then aiming for optimal results where we have the mother, the daughter, and the grand daughter then the commercial technology application involves public/private sector interface.

Rejuvenating local diversity, incorporating the local varieties and at the same time improving them is the goal. This is traditionally the kind of yield that farmers get from their traditional bananas. Then with the introduction of the tissue-culture technology, it is reducing famine and poverty because the same farmer now is able to get a bigger bunch, the income is raised and the orchard is increased. Now this farmer is able to improve on the orchard, expand it.

It also empowers women. This lady has now become a group leader, she trains others and she is also a seedling distributor. The technology has prospects for commercial banana production because of the uniformity in production in maturity and they are able to get the supplies to market.

We do have challenges for this project and the first of the challenges is to set-up the services of the distribution system, of the seedling and the fruit. The cost of the plantlet has continued to be a major cost where we have developed a kind of a model based on the gramine bank model of a revolving fund where we have groups of farmers guaranteeing each other because they do not have collateral. Many of them are women, then farm inputs, manure, especially water, is a critical problem that we have to solve. Even when the farmers have clean planting materials they also have problems of diseases and pests within their farms.

We are in the process of revising the project. We are in phase-2, so we need a banana grower organisation to give farmers a greater voice, to have more say in terms of the way in which technologies are run. We need the government of Kenya and other agencies to regulate the labs for quality control, then disease diagnostics and new partners to mobilise impact.

This is the kind of link that we are talking about. We need to establish a self-sustaining system that can run without ISAAA. Our forecast is on food security and income generation for the poor. We have seen that with micro-credit it can work and the use of farmer schools so that we can expand on the extension system, which is missing or which has collapsed in Kenya.

I want to end my presentation with one message. We continue hearing biotechnology versus organic farming. We need to understand that in developed countries when you talk about organic farming you are already starting at an advantage because you start with high quality seeds. Now in developing countries, when you talk about organic farming, when the Greens go to Africa to talk about organic farming, you are starting with low quality seeds, poor soils and unsustainable systems. We continue destroying our biodiversity and at the same time we cannot compete on the same level, even in terms of organic farming.

So thank you very much for your attention.